REMARKS

Claims 1-4 are pending in the present application. Claims 3-4 are currently withdrawn from consideration. In view of the following remarks, the Examiner is respectfully requested to withdraw all rejections and allow the currently pending claims.

Issues under 35 U.S.C. § 103

The Examiner has rejected claims 1 and 2 under 35 U.S.C. § 103(a) as being unpatentable over Yushio et al. '400 (US Patent 6,423,400) in view of Yamakawa et al. '907 (US Patent 5,370,907) and Ito et al. '223 (PCT/JP02/08223) (English translation is US 2004/0071945). Applicants respectfully traverse this rejection. Reconsideration and withdrawal of the outstanding rejection are respectfully requested based on the following considerations.

Legal Standard for Determining Prima Facie Obviousness

MPEP 2141 sets forth the guidelines in determining obviousness. First, the Examiner has to take into account the factual inquiries set forth in *Graham v. John Deere*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), which has provided the controlling framework for an obviousness analysis. The four *Graham* factors are:

(a) determining the scope and content of the prior art;

(b) ascertaining the differences between the prior art and the claims in issue;

(c) resolving the level of ordinary skill in the pertinent art; and

(d) evaluating any evidence of secondary considerations.

Graham v. John Deere, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966).

Second, the Examiner has to provide some rationale for determining obviousness. MPEP 2143 sets forth some rationales that were established in the recent decision of *KSR International Co. v Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007). Exemplary rationales that may support a conclusion of obviousness include:

(a) combining prior art elements according to known methods to yield predictable results;

(b) simple substitution of one known element for another to obtain predictable results;

(c) use of known technique to improve similar devices (methods, or products) in the same way;

(d) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(e) "obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success

(f) known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;

(g) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

As the MPEP directs, all claim limitations must be considered in view of the cited prior art in order to establish a *prima facie* case of obviousness. *See* MPEP 2143.03.

The Present Invention and its Advantages

The AlN junction body of the present invention has a basic structure in which a sintered metal layer of tungsten or molybdenum having a thickness of 15 to 100 μm is sandwiched and joined between two pieces of AlN sintered plates. As described in claim 1, the sintered metal layer has the following properties:

(a) the sheet resistivity of the sintered metal layer is not larger than 1×10^{-1} Ω/□, exhibiting excellent electric conductivity;

(b) warping of the sintered metal layer is not more than 100 μm/100mm, forming a flat shape; and

(c) sintered metal layer is joined to the AlN sintered plates so as to possess a shear strength of 4 kg/mm^2.

Upon applying a high DC voltage to the sintered metal layer, the AlN junction body provided with the sintered metal layer having the above properties generates a uniform electrostatic adsorbing force on the surfaces of the AlN sintered plates. This makes it possible to

stably hold a semiconductor wafer even under severe conditions and can be preferably used as an electrostatic chuck.

The above AlN junction body can be produced by charging an electrically conducting paste containing a fine tungsten or molybdenum powder (having an average particle size of not larger than 3.5 μm) in a recessed portion formed in the surface of the AlN sintered plate. An adhesive layer is formed by applying an adhesive paste containing AlN onto the surface of the AlN sintered plate followed by dewaxing. Another AlN sintered plate is then brought into pressed contact with the surface on which the adhesive layer has been formed. Sintering is then effected in this state in two steps at a temperature of 1600 to 1700°C (primary sintering) and at a temperature of 1800 to 1900°C (secondary sintering). When the above method is employed, the AlN junction body having the above-mentioned properties is obtained. Other methods, such as those of the prior art, do not result in the present AlN junction body.

Distinctions over the Cited Prior Art

Yushio et al. '400 disclose an AlN junction body having a high-melting metal layer disposed between two pieces of AlN plates. The Examples of Yushio et al. '400 disclose the production of the AlN junction bodies by firing an adhesive paste comprising AlN interposed among the high-melting metal layer (30 μm thick) and the AlN plates. The high-melting layer in the AlN junction body features a large strength against peeling as well as small warping. Therefore, the Examiner asserts that the AlN junction body of Yushio et al. '400 satisfies the conditions specified by the present invention concerning the warping and shear strength. Furthermore, the Examiner asserts that there is no distinction between the present invention and Yushio et al. '400 with respect to the sheet resistance even though Yushio et al. '400 fail to disclose anything concerning sheet resistance.

The high-melting metal layer in the AlN junction body of Yushio et al. '400 is blended with a low-melting glass in order to improve the bonding strength (col. 8, lines 55-59). In fact, the high-melting metal layers in many AlN junction bodies prepared in the Examples of Yushio et al. '400 all contain a low-melting glass in amounts of not smaller than about 10% by weight (Table 6). In other words, the AlN junction body of Yushio et al. '400 in which the high-melting

metal layer is blended with the low-melting glass has a very high sheet resistance that would exceed far beyond the claimed range of not larger than 1×10^{-1} Ω/□.

As recited in the claims of the present application, the condition of the sheet resistance being not larger than 1×10^{-1} Ω/□ means that the high-melting metal layer is blended without a high electric resistance component such as a low-melting glass. The AlN junction body of the present invention suppresses warping (not larger than 100 μm/100 mm) and has a high shear strength (not less than 4 kg/mm^2) without blending the high-melting metal layer with such a high electric resistance component. Thus, the present invention is very different from Yushio et al. '400.

According to Yushio et al. '400, the high-melting metal layer is blended with the low-melting glass to improve the bonding strength in order to prevent the occurrence of warping. However, the low-melting glass is present in the interface between the high-melting metal layer and the AlN plate. Thus, the strength against peeling may be high, but the shear strength would be expected to be inferior to the present invention. Therefore, the present invention is also very different from Yushio et al. '400 in this way.

If the AlN junction body of Yushio et al. '400 is produced without using the low-melting glass, the high-melting metal foil greatly warps at the time of firing since no dent has been formed in the surfaces of the AlN plates. Since the firing is conducted in one step, the high-melting metal layer quickly shrinks. As a result, the AlN particles in the adhesive paste fail to fill the space formed by the shrinking of the junction interface relative to the high-melting metal layer. Therefore, warping stemming from the shrinking cannot be suppressed, and the AlN particles lose their anchoring effect. That is, if no low-melting glass is used in Yushio et al. '400, the sheet resistance can be decreased but the warping becomes conspicuous, and the junction strength (shear strength) greatly decreases among the high-melting metal layer and the AlN plates. Thus, the AlN junction body of Yushio et al. '400 cannot satisfy both conditions for warping and shear strength recited in claim 1.

The Examiner admits that the Yushio et al. '400 reference is silent as to the sheet resistivity of the metal layer. However, the Examiner asserts that the sheet resistivity would be the same since Yushio et al. '400 allegedly teach the same materials and the same overlapping

layer thickness ranges. As the Examiner noted, the *prima facie* case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed products. Applicants respectfully submit that the AlN junction body of Yushio et al. '400 does not possess all of the characteristics of the present invention for the reasons given above. As such, the Examiner's *prima facie* case has been rebutted.

As discussed above, Yushio et al. '400 do not disclose each and every aspect of claim 1. Applicants respectfully submit that Yamakawa et al. '907 and Ito et al. '223 do not overcome the deficiencies of this reference.

Specifically, Yamakawa et al. '907 disclose an AlN junction body of a structure in which a high-melting metal layer is held by two pieces of AlN sintered substrates. The AlN junction body of Yamakawa et al. '907 prepared by using adhesive paste containing AlN powder is the same as preparing the AlN junction body according to Yushio et al. '400 without using the low-melting glass. The sheet resistance of the present invention may be satisfied, but the conditions relating to the warping and shear strength specified by the present invention can never be satisfied. Thus, Yamakawa et al. '907 fail to overcome the deficiencies of Yushio et al. '400.

Regarding the final reference, Ito et al. '223 disclose the preparation of a ceramic junction body by sintering (so-called co-firing) green sheets (which are not the sintered bodies) with an electrically conducting paste interposed therebetween, which is radically different from the present invention.

In stark contrast, the present invention employs means for firing two pieces of AlN sintered plates (which have been sintered already), holding the high-melting metal paste therebetween. If the ceramic junction body is produced by co-firing the green sheets as disclosed by Ito et al. '223, shrinking occurs so that warping cannot be suppressed to the degree recited in claim 1 of the present application. Thus, Ito et al. '223 do not overcome the deficiencies of the other cited references.

To establish a *prima facie* case of obviousness of a claimed invention, all of the claim limitations must be disclosed by the cited references. As discussed above, Yushio et al. '400 in view of Yamakawa et al. '907 and Ito et al. '223 fail to disclose all of the claim limitations of independent claim 1, and those claims dependent thereon. Accordingly, the combination of

references does not render the present invention obvious. Furthermore, the cited references or the knowledge in the art provide no reason or rationale that would allow one of ordinary skill in the art to arrive at the present invention as claimed. Therefore, a *prima facie* case of obviousness has not been established, and withdrawal of the outstanding rejection is respectfully requested. Any contentions of the USPTO to the contrary must be reconsidered at present.

CONCLUSION

A full and complete response has been made to all issues as cited in the Office Action. Applicants have taken substantial steps in efforts to advance prosecution of the present application. Thus, Applicants respectfully request that a timely Notice of Allowance issue for the present case clearly indicating that each of claims 1-2 are allowed and patentable under the provisions of title 35 of the United States Code.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Chad M. Rink, Reg. No. 58,258 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

By 

Craig A. McRobbie
Registration No.: 42,874
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road
Suite 100 East
P.O. Box 747
Falls Church, Virginia 22040-0747
(703) 205-8000
Attorney for Applicants